



# PATENT SPECIFICATION

603,598

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(Under Section 6 (1) (a) of the Patents &c. (Emergency) Act, 1939, the proviso to Section 91 (4) of the Patents and Designs Acts, 1907 to 1942, became operative on Oct. 23, 1945).

Index at acceptance:—Classes 32, B2x; and 64(iii), V1.

## COMPLETE SPECIFICATION

### An Improved Method of and Means for Condensing Corrosive Vapours

- We, SOCIÉTÉ POUR L'EXPLOITATION DES  
PROCÉDÉS AB-DER-HALDEN, a French  
body corporate, of 26, rue de la Baume,  
Paris, France, do hereby declare the  
nature of this invention and in what  
manner the same is to be performed, to be  
particularly described and ascertained in  
and by the following statement:—
- This invention relates to a method of  
condensing the vapours of substances which  
are liable to attack the metal of which  
pipe-coils are composed; the invention also  
relates to a pipe-coil cooler for putting the  
method into practice.
- In known pipe-coil coolers, for example,  
those mounted to follow distillation  
columns, vapours flow into the coil at its  
upper end and the condensed liquid flows  
out at its lower end. In order that the  
flow may be possible, it is necessary that  
the temperature of the cooling coil should  
be sufficiently high to obviate solidifica-  
tion of the liquid, which would be liable  
to obstruct the pipe-coil of the cooler.
- During their passage through the coil the  
vapours and the liquid attack the metal  
of the coil at the temperature in question,  
and this may have serious disadvantages.
- Thus, it is known that phenol deriva-  
tives are acid products which attack steel  
when in hot state. Though the wear  
caused thereby is small, such attack  
results in colouring the condensed pro-  
ducts and renders them unacceptable.
- This difficulty is generally overcome by  
employing coolers made of copper, rustless  
steel, and even silver-plated material,  
whereby the cost of the apparatus is con-  
siderably increased.
- The object of this invention is to remedy  
this difficulty by means of a pipe-coil made  
of any desired metal, and by choosing for  
cooling said pipe-coil such a cooling liquid  
that the concerned corrosive substances  
are solid at the temperature of the cool-  
ing liquid.
- The method according to the invention  
consists in introducing the vapours at the  
lower end of a reflux-operating pipe-coil,

evacuating the condensed product like-  
wise at the lower end thereof, and using  
a cooling fluid having a temperature such  
that the temperature of the coil walls is  
lower than the solidification point of the  
condensate, so as to line the said coil walls  
with a film of solid product and thus pro-  
tect the coil metal from being attacked  
by the vapours or the liquid.

The device according to the invention  
is of the type comprising a pipe-coil  
immersed in a cooling tank, wherein said  
pipe-coil has branched thereto, at the  
immersed lower end thereof, a vapour in-  
let conduit, the lower end of said pipe-coil  
being connected with the condensate  
collector and the upper end thereof being  
adapted to discharge the uncondensed  
vapours.

The accompanying drawing shows by  
way of example a cooling device with a  
helical coil for carrying into effect the  
method according to the invention.

Hot vapours coming in through a con-  
duit 1 are introduced into the lower end  
of a helical reflux-operating pipe coil 2.  
The condensate is discharged through a  
conduit 3. Water or other cooling agent,  
introduced at the tank bottom through an  
inlet 4, circulates in parallel with the  
vapours and flows out through an outlet  
5. A vacuum may be created if desired  
through a connection 6 for non-condensed  
vapours.

It will be seen that hot vapours arriv-  
ing in through the conduit 1 come  
immediately into contact with a cooled  
wall, the temperature of the latter being  
so regulated that the vapours condense and  
solidify in the form of a solid film, which  
protects the metal of the pipe-coil from  
being attacked by the product in question.  
For example, in the case of the condensa-  
tion of phenol vapours there is formed on  
the cold coil wall a film of phenic acid or  
of crystallised ortho-cresol.

The thickness of this film is self-regu-  
lating, for if it becomes too thick the  
abstraction of heat by the cooling fluid

will be no longer effected, and the vapours will cause it to melt until the heat transmission is restored. This obviates any necessity for regulating the cooling fluid supply, while the outflow of the condensate through the conduit 3 is maintained automatically by keeping the condensate above its melting point.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A method of condensing the vapours of substances which attack the metal of the condensing pipe-coil, consisting in introducing the vapours into a reflux-operating pipe-coil at the lower end thereof, discharging the condensate likewise at the lower end of the coil, and utilising a cooling fluid having a temperature such that the temperature of the coil walls is lower than the solidification point of the con-

densate, so as to line the said walls with a film of solid product, thereby protecting the coil metal from being attacked by the vapours or the liquid. 25

2. A cooling device for condensing vapours by the method claimed in claim 1, of the type comprising a pipe-coil immersed in a cooling tank, wherein said pipe-coil has, branched thereto, at the immersed lower end thereof, a vapour inlet conduit, the lower end of said pipe-coil being connected with the condensate collector and the upper end thereof being adapted to discharge the uncondensed vapours. 30

3. A method of or means for condensing the vapours of substances which attack the metal of condensing pipe-coils, substantially as hereinbefore described with reference to the accompanying drawing. 35 40

Dated this 23rd day of October, 1945.  
MARKS & CLERK.

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[This Drawing is a reproduction of the Original on a reduced scale.]

